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ABSTRACT

This study identified two types of interference between Hungarian and English: phonetic and phonological interference. Four native speakers of Hungarian who are second language speakers of English read a passage containing a wide variety of sounds in different phonological environments. A set of rules mapping American English onto Hungarian-accented English was then written for each speaker. Subjects B, C, and D represented a broader class of subjects than subject A, who was younger and highly educated. As B is considered typical, this study describes and compares the mapping rules of subjects A and B only. In the case of subject B, all English sounds not occurring in Hungarian undergo substitution, whereas for subject A such substitutions are minimal. Both subjects make phonetic substitutions for sounds occurring in Hungarian but not in English. Available data indicate that the only Hungarian phonological rule that interferes is voicing assimilation and that this interference is optional. Both subjects used a type of rule characterized as "natural," which apparently arises from an innate conception of a simpler pronunciation. Finally, subject B's data indicated two other types of mispronunciation classified as "spelling" and "idiosyncratic" pronunciation. Out of 56 college students, 49 selected subject A as the more "native sounding" speaker. Therefore, it was concluded that the specific differences noted between the speech of subject A and subject B contribute to one's ability to substantively characterize the notion of "degree of foreign accent." (AMH)

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A STUDY OF ENGLISH SECOND LANGUAGE PHONOLOGY

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Introduction

This is a preliminary report of a study to investigate the phonological aspects of the speech of second language speakers and is interested in examining the following questions:

1. Does the phonological system of the native language interfere with the phonological system of the second language?
2. If so, what is the nature of this interference?
3. Are factors other than native language interference involved in the speech of second language speakers?
4. If so, what is the nature of these factors?
5. What constitutes a "better" or "worse" foreign accent?

We will attempt to provide answers to these questions by examining the reading of an English passage by native speakers of Hungarian who are second language speakers of English.

Method

Four native speakers of Hungarian who are second language speakers of English were presented with a written copy of "The Rainbow Passage," reprinted in Appendix I, and were asked to read the sentences aloud.

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This passage was selected because it has a wide variety of sounds in different phonological environments. The readings were tape recorded and transcribed into broad phonetic notation and were compared to educated New York American English pronunciation. A set of rules mapping American English onto Hungarian-accented-English was then written for each speaker.

Results

Chart A below specifies the age, sex, number of years spent in the U.S., and formal education in the U.S., of each subject:

Chart A

Subject	Age (1977)	Sex	Age moved to U.S.	Formal education in U.S.
A	29	M	16	8 years of college (Ph.D.)
B	56	F	44	none
C	61	M	49	none
D	54	F	34	none

As can be seen, the backgrounds of subjects B, C, and D are relatively similar. The results of the experiment paralleled this similarity: the mapping rules of speakers B, C, and D described the same basic patterns. The background of subject A differs markedly from the backgrounds of the other subjects: he is younger, moved to the U.S. in his mid teens, and holds a Ph.D. degree. In certain respects, the mapping rules of his speech differed significantly from those of the other subjects.

For present purposes, then, it will be sufficient to describe and compare the mapping rules of subjects A and B only; the latter represents a broader class of subjects. The transcribed speeches of subjects A and B are given in Appendices II and III, respectively.[1]

Discussion

Our results indicate that the phonological system of Hungarian interferes with that of English. The interference is of two types. The first type can be called phonetic interference: a sound which occurs in Hungarian is substituted for an English sound which does not occur in Hungarian. E.g.:

(1) American English => Hungarian-Accented English

a. retroflexed r => trilled r (subject A sporadically, subject B generally)

b. aspirated C => unaspirated C (A sporadically) B generally)

c. æ => $\underset{\wedge}{æ}$ (A sporadically)

d. æ => ɛ (B generally)

e. w => v (B generally)

f. θ => t (B generally)

g. ð => d (B generally)

h. ə => ö (B generally)

i. I => i (B generally)

j. U => u (B generally)

k. ʌ => a, ɒ, o (B generally)

So, for instance, in subject A's speech [ð] was pronounced as [d] in the, they, that, etc., but remained [ð] in then, with, other, etc.; aspirated voiceless stops sometimes were deaspirated; r was trilled in form, strikes, rainbow, apparently, ever, etc., but was retroflexed in raindrops, air, considered, etc. (In Hungarian, [æ] does not occur, voiceless stops are unaspirated, and r is trilled.) Similarly, [æ] was pronounced with higher tongue position, between [æ] and [ɛ] (= $[\underset{\wedge}{æ}]$, and [ɔ] was pronounced

lower as [ɒ]. (In Hungarian, the lowest unrounded front vowel is [ɛ], and the lowest rounded back vowel is [ɒ].)

Speaker B employed extensive low level sound substitutions. Among the consonants, the most notable substitutions were: [v] for [w][2], [t] for [θ], trilled r for retroflexed r, unaspirated obstruents for aspirated obstruents, and [d] for [ð][3]. These pronunciations were consistent and pervasive, and clearly due to the fact that Hungarian lacks [w], [θ], retroflexed r, aspirated obstruents, and [ð].

The most salient vowel substitutions were: [ɛ] for [æ][4], [ö] for [ə], [i] for [I], [u] for [U], and [a], [ɒ], or [o] for [ʌ][5]. Vowels were generally lengthened under stress.

The above substitutions raise a number of questions. First, are there any sounds in English, not occurring in Hungarian, which the native Hungarian speaker does not substitute? In the case of subject B, it appears that all English sounds which do not occur in Hungarian undergo substitution. As for subject A, the low level sound substitutions are minimal; the sounds [w], [θ], [ð], [ə], [I], [U], and [ʌ] are kept.

Secondly, are there any sounds in Hungarian, not occurring in English, which the native Hungarian speaker uses in phonetic substitution? The answer quite obviously is affirmative: both subjects A and B used trilled r in place of retroflexed r; speaker B also substituted the front mid rounded vowel [ö] for English [ə].

Thirdly, are there any sounds in English which also occur in Hungarian but which undergo phonetic substitution? The answer, clearly is negative.

Fourthly, is phonetic interference uniform within a language or does it vary from speaker to speaker? Our results are consistent with the well known observation that speakers of a second language use basically the same substitutions. All our subjects (C and D included) replaced sound X of English with the same or nearly the same sound of Hungarian, if they substituted at all.

Fifthly, we may ask, why do Hungarian speakers substitute one sound rather than another for an English sound? For example, why were the sounds [æ̂] and [ɛ], and not others, substituted for the English sound [æ] by speakers A and B, respectively? The answer lies in the phonetic and acoustic characteristics of the speech sounds: the substituting sound is one of the closest, if not in fact the closest articulatory or acoustic equivalent of the substituted sound. Usually, phonetic similarity plays the dominant role. However, in the case of [ə] => [ö], the substitution is best explained in acoustic terms. Which of two phonetically equidistant sounds is selected for substitution by second language speakers is an important issue, but one which lies outside the scope of the present study.

Lastly, how consistent are the substitutions across subjects? As is evident in (1), phonetic interference is more general and extensive in the speech of subject B than in the speech of subject A.

The second type of interference can be called <u>phonological interference</u>: a phonological rule of Hungarian is applied in English. From our limited range of data, it appears that the only Hungarian rule which interferes with the English phonological system is voicing assimilation: this interference is optional.

In Hungarian, an obstruent is assimilated in voicing to a following obstruent. This voicing assimilation process takes place inside a word as well as between words. English, as is well known, contains a voicing assimilation rule which voices the plural s, among others, following voiced sounds. This progressive voicing assimilation rule conflicts with the Hungarian regressive voicing assimilation rule. Subject A resolved this contradiction in favor of his native language rule in pronouncing the final consonant cluster of floods as [ts].

The application of the Hungarian voicing assimilation rule is discernible in the following forms, where the underlined letters were pronounced voiceless:

(2)

have tried	gods to
have throughout	gods passed
boiling pot	depends considerably
according to	beyond his
looking for	observed

The assimilation of a voiceless obstruent to a following voiced obstruent was evident in about the [aboddö].

We may ask if there are any rules occurring in Hungarian, not occurring in English, which the Hungarian speaker does not apply to English. The answer to this must be yes. One very obvious example is that while there is vowel harmony in Hungarian, none of the subjects tested harmonized English vowels. As for why some rules interfere and others do not, we would hypothesize that only low level rules cause interference for second language speakers, although this matter requires further investigation.

Our results also indicate that there exists a class of mapping rules which cannot be explained as interference from the native language. Rather, these rules can be be characterized as natural rules: they describe common, plausible, or "unmarked" phonological processes.[6]

The following natural rules were exhibited by our subjects:

(3) a. obstruent => [-voice] / ____ # (B optionally)

b. obstruent => [-voice] / ____ pause (A optionally)

c. stressed V => [+ long] (A, B generally)

d. d => ∅ / C ____ C (A generally)

e. fricative => affricate / nasal C ____ # (B generally)

Subject A showed evidence of sporadic devoicing of word final obstruents before pause. E.g.: end [t], ways [s], colors [s], floods [s], but formed [d], bows [z]; each of these words occurred in sentence final position. The pronunciation end [nt] cannot be explained as spelling pronunciation; the others perhaps can. Native language interference is ruled out, as word final obstruents are not devoiced in Hungarian.[7] The devoicing of final d in end, and probably the other final obstruents in the above examples as well, is explained by markedness principles: voiceless obstruents are less marked in word final position or before pause.

Subject A did not pronounce the consonant d in interconsonantal positions in the examples beyond his and depends. This cluster simplification resulted in a more natural syllable structure.

Subject B occasionally devoiced a word final voiced obstruent even if the next word began with a voiced sound. E.g: band [t] increases,

something [k] beyond, end [t] of. Interference cannot be the explanation here. Rather, the speaker exhibited the natural process of devoicing word final obstruents.

Subject B affricated the dental fricative s in word final position following the nasal n. E.g: sun's [sʌnts], difference [differents]. Again, this is due to a natural assimilation process: the closure at the dental region is maintained during the articulation of the post-nasal homorganic consonant.

The above results suggest that the second language speaker is applying rules not only from his native language, but also from his innate conception of what is a simpler pronunciation. We hypothesize that the rules in (3) are drawn from a universal set.

A third group of mapping rules can best be described as examples of spelling pronunciation. Only subject B showed evidence of spelling pronunciation. When this speaker was unfamiliar with a word or uncertain as to its pronunciation, she pronounced it as it was spelled. Since Hungarian spelling is phonetic in character, it is particularly natural that some Hungarian speakers should look to English spelling to aid them in pronunciation.

Subject B generally pronounced the grammatical morphemes -ed 'past' and -s 'plural' and 'third person singular' in their orthographic shapes. The past tense marker -ed was pronounced as [ɛd] in all of its occurrences (explained, mixed, considered, paused, caused, formed, colored, observed, complicated, accepted), save one: used was pronounced as [yust]. Apprently, the [ɛd] pronunciation is not conditioned phonologically:

compare used [yust] with caused [kɒzɛd]. Rather, in reading style speaker B pronounced -ed as it was spelled; the pronunciation of used was apprently memorized, perhaps due to the relative frequency of this word in speech.

In the following words, the plural and third person singular morphemes were pronounced as [s]: (The following word is also given.)

(4)

colors. This	sun's rays by[8]
ends apparently	causes the
finds it	ideas about
centuries men	increases the
Hebrews it	bows if

The voiceless quality of -s cannot be attributed to voicing assimilation in the above contexts: neither English nor Hungarian devoices s before a voiced obstruent, sonorant consonant, or vowel. Spelling pronunciation seems to be the most plausible explanation.[9]

Spelling pronunciation was exhibited occasionally with certain function words, as in is not [isnat], at the [ɛtdö]. of the [ɒfdö] but cf. of the [ɒvdö], of gold [ɒvgold], as a [ɛsa] (but cf. as the [ɛzdö]), and quite generally with geminate consonants.[10]

Finally, we found examples which could not be characterized as due to interference, naturalness, or spelling pronunciation. These pronunciations occurred only in subject B's data; they were inconsistent, though quite extensive. We can classify them as idiosyncratic pronunciations. Some examples: rainbow [reynbon] like [laykt], beautiful [byutifor], token [tekn], imagine [imič], bridge [brayt], phenomenon [fɛnomɛn], thought [tɛkst], since [saynd] found [faynd], width [vayd]. Some of these words were apparently confused with other, morphophonemically related words, as in the cases of imagine, found, and width, which perhaps were confused with image, find, and wide, respectively. In the pronunciations of bridge and since the [ay] variant of /i/ was used, incorrectly.[11] Other pronunciations, such as those of like, beautiful, and rainbow, are truly idiosyncratic in nature. Still others are due to unsure pronunciations: e.g., beyond [biyant]∿[biyont], a [a]∿[ɛ]∿[ö].

Conclusion

In this report we have analyzed some of the most obvious mispronunciations of two native speakers of Hungarian who were asked to read a passage in English. We have classified these pronunciations into four general categories: 1, native language interference, both phonetic and phonological; 2, natural rules; 3, spelling pronunciations; 4, idiosyncratic pronunciations.

It is important to note that we have analyzed the Hungarian speakers' pronunciation of English as a series of mapping rules, going from American English to Hungarian-accented-English, i.e., taking

American English to be in some sense underlying. It would be desirable to also analyze the second language speakers' second language phonological system in isolation, as a complete system, and then to compare this system to the systems of both the native and the second languages as spoken by native speakers. The nature of the particular task used here, that of reading a passage, did not allow us to pursue this course.[12]

The four general categories of mapping rules we discovered define, in part, what a "foreign accent" is, at least as far as reading style is concerned. Can we draw conclusions as to what constitutes a "better" or worse" foreign accent? To answer this question, we contrasted the number and types of mapping rules for each of our two subjects. We found that subject B used more wide spread sound substitutions than subject A, that B substituted some sounds obligatorily while A did not, that B utilized more articulatory/acoustic simplifications (natural rules) than A, and that spelling pronunciation and idiosyncratic pronunciation were characteristic of B's speech but not A's. We then had 56 Queens College undergraduate students listen to the tape recordings of subjects A and B, and asked them the following question: which speaker sounds more like a native speaker of English? 49 students selected subject A as the more native sounding speaker. That is, the foreign accent of subject B was much more salient than that of subject A. Thus, the specific differences we noted between the speech of subject A and subject B contribute to our ability to substantively characterize the notion "degree of foreign accent."

Notes

[1] Our analyses include only the most obvious mapping rules for our subjects. A more detailed description would necessitate instrumental investigation. The transcriptions in the appendices exclude information on intonation, stress, vocalic length, aspiration, and similar precise phonetic detail, although the general patterns of vocalic length and aspiration are briefly mentioned in the body of the text.

[2] But cf. the variants [wan], [wɒn], [uɒn] for the word one. The speaker seemed to be struggling with this word.

[3] [z] was substituted for [ð] in the words they and there, [d] elsewhere. E.g: the [dö], this [dis], with [vid], without [vidot], that [dat], other [ɒdör]. These pronuncations probably are not rule governed: the substitution rule ð => z / ____ {ɛ, e} (ð => d /elsewhere) does not make sense.

[4] But [æ] was pronounced in the words primary and that.

[5] E.g: colors [kalörs], sunlight [sɒnlayt], above [abov]. The [o] pronunciation may be due to the spelling.

[6] See Schane (1968) for a discussion of the notion of naturalness in phonology.

[7] For a detailed analysis of Hungarian phonology, see Vago (1978).

[8] Note that the possessive morpheme is also pronounced as [s].

[9] Word final devoicing is also a possible explanation, although less plausibly, since the voiceless pronunciation is a general fact of morphemes spelled with s.

[10] Since Hungarian contains geminate consonants, the long pronunciation of geminate consonants can also be due to native language interference.

[11] In universal [yuniverzal], the [z] pronunciation of written s was overgeneralized.

[12] Smith (1973) concluded that the first language phonology acquisition can best be described by viewing the adult English as underlying. This issue is, however, an important one, and one which requires further investigation.

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Appendix II: Subject A's Data

də reynbow pæsəǰ

wɛn ðə sʌnlayt strayks reyndrʌps In dI eyr, dey æ̂kt layk ey prisəm æ̂nd form e reynbow. ðə reynbow Iz ey dIvIž̌ən ʌv wayt layt IntU mæ̂nI byUdIfəl kʌlərs. ðiyz tek ðə šeyp ʌv ey lʌŋg rʌwnd ʌrč̌, wIð Its pæ̂θ hay ɛbʌv, æ̂nd Its tu ɛndz ɛpæ̂rɛntlI bIyʌnd di horayzən. ðɛr Iz, ɛkordIŋ tə lɛǰənd, e boylIŋ pat ʌv gold ɛt wʌn ɛnt. piypəl lUk bʌt no wʌn ɛvər faynds It. wɛn e mæ̂n lUks for sʌmθIŋ biyʌn hIz riyč̌, hIz frɛndz sey hI Iz lUkIŋ for də pad ʌv gold æ̂t di ɛnd ʌv də reynbow. θruwowt də sɛnč̌ərIs mɛn hæ̂v ɛkspleyn də reynbow In væ̂riyəs weys. sʌm hæ̂v æ̂kseptəd It æ̂z ey mIrəkl̩ wIðɒwt fIzəkl̩ ɛksplənеyšən. tu də hIbruwz It wʌz e towkən ðæ̂t ðɛr wUd biy now mor yUnIvərsəl flʌts. ðə griyks yust tə Imæ̂ǰən ðæ̂t It wʌz ey sayn frəm ðə gadz tu fortɛl wɔr or hɛviy reyn. ðə norsmɛn kənsIdərd də reynbow æ̂z ey briǰ ovɛr wIč̌ ðə gadz pæ̂st frəm ərθ tu ðɛyr hom In də skay. ʌðər mɛn hɛv črayd tu ɛkspleyn ðə fInamɛnən fIzIkliy. ʌrIstʌtl̩ θʌt ðæ̂t ðə reynbow wʌz kʌzd bay rIflɛksənz ʌv ðə sʌnz reyz bay də reyn. sIns ðɛn fIzIsIsts hɛv fʌwnd ðæ̂t It Iz nat rIflɛkšən bat riyfræ̂kšən bay ðə reyndraps wIč̌ kʌzəz ðə reynbow. mɛniy kʌmplIkeytəd aydiyəz əbawt ðə reynbow hɛv biyn formd. ðə dIfərəns In ðə reynbow dIpɛns kʌnsIdərɛbliy ʌpʌn ðə sayz ʌv ðə wʌtɛr draps, æ̂nd ðə wItθ ʌv ðə kʌlərd bæ̂nd Iŋkriysəz æ̂z ðə sayz ʌv ðə draps Iŋkriysəz. ðə ɛkč̌uwəl praymərI reynbow ʌbzərvd Iz sɛd tu biy ðiy Ifɛkt ʌv sUpɛrpozIš̌n ʌv e nʌmbər ʌv bowz. If ðə rɛd ʌv ðə sɛkənd bow fʌlz ʌpon ðə griyn ʌv ðə fərst, ðə rIzʌlt Iz tu gIv e bow wIð ɛn æ̂bnormələliy wayd yɛlow bæ̂nd, sIns rɛd æ̂nd griyn layts, wɛn mikst, form yɛlow. ðIs Iz e vɛri kʌmən tayp ʌv bow, wʌn šowIŋ meynliy rɛd æ̂nd yɛlow, wIð litəl or now griyn or bluw.

Appendix III: Subject B's Data

dö reynbon pɛssiˇ

vɛn dö spnlayt strayks reydraps in dö eyr, zey ɛkt laykt a prizn̩ ɛnt form a reynbou. dö reynbou iz ö divižn̩ of vayt laykt into mɛni byutifor kalörs. dis teyk dö šeyp of ö laŋg raund ɛrč, vid its pɛt hay abouv ɛnd its tu ɛnts apɛrɛntli biyand dö horizon. zeyr is, akordiŋk tu lɛgɛnt, ö boyliŋk pat of gold ɛt wan ɛnt. pipl̩ luk, bat no wpn ɛvɛr faynts it. vɛn ö mɛn luks for samtiŋk biyont hiz rič, his frɛnts sey his lukiŋk for dö pat pv gold ɛt dö ɛent of dö reynbou. [trat dö sɛnturis mɛn hɛf,] truaut dö sɛnturis mɛn hɛv ɛksplenɛd dö reynbou in vɛrios veys. sam hɛv ɛksɛpted it is, it ɛs a mirökl̩, vidot fizišn̩ ɛksp... tu dö hibrus it vas ö tekn dɛt zeyr vud bi no mor yuniverzal floudz. dö griks yuzt tu imič dat it vaz a sayn for, from dö gats tu fortɛl var or hɛvi reyn. dö norsmɛn kansidɛrɛd dö reynbon iz a brayt ovɛr vič dö gats pɛssɛd from ɛrt tu zeyr hom in dö skay. pdör mɛn hɛf trayt tu ɛkspleyn dö fɛnomɛn psi... aristotl̩ tpkst dat dö reynbon vas kausɛd bay rɛflɛkšn̩ pv dö spnts reys bay dö reyn. saynd dɛn psi... fizisists hɛf faynd dat it is nat rɛflɛkšn̩ bat rɛfrɛkšn̩ bay dö reyndraps vič kauzɛs dö reynbou. mɛni kampliketɛd aydeyas aboud dö reynboun hɛv bin formɛd. dö differɛnts in dö reynboun di...dɛpɛnts kansidɛreybl̩ apn̩ dö sayz pv dö vatɛr draps ɛn dö vayd pv dö kalörɛd, kalör...bɛnt iŋkrey ɛs dö sayz pv dö draps iŋkreysɛs. de ɛktuɛl prrimɛri reynbou apsörvɛd is sɛd tu bi dö ɛffɛkt pf superpozišn̩ pf a nambɛr pf bous if dö rɛd pv dö sɛkond bou fplls apon dö grin pv dö först. dö rizplt is tu giv a bou vit ɛn abnormɛlli vayt yɛllou bɛnd, sayns rɛd ɛn grin layt, vɛn miksɛd, form yɛllou. diz is a vɛri kamon tayp pf bou, upn soiŋk meynli rɛd ɛnd yɛllou, vit litl̩ or no grin or blu.